

Claims

- [c1] 1. A system for detecting moisture penetration into an integrated circuit (IC) chip comprising:
an IC chip having an insulator which includes a low-K dielectric material;
a moisture barrier/edge seal for the IC chip; and
a moisture damage sensor circuit positioned on the IC chip in proximity to the moisture barrier/edge seal.
- [c2] 2. The system of claim 1, including a plurality of moisture barrier/edge seals positioned along peripheral edges of the IC chip, and the moisture damage sensor circuit is positioned between the plurality of moisture barrier/edge seals to detect when a moisture barrier/edge seal on the IC chip is damaged.
- [c3] 3. The system of claim 1, including a plurality of moisture barrier/edge seals positioned along peripheral edges of the IC chip, and the moisture damage sensor circuit is positioned between an active area of the IC chip and the plurality of moisture barrier/edge seals to detect when a moisture barrier/edge seal on the IC chip is damaged.

- [c4] 4. The system of claim 1, including a plurality of moisture barrier/edge seals positioned along peripheral edges of the IC chip, and the moisture damage sensor circuit is positioned on a peripheral area of the IC chip outside of the plurality of moisture barrier/edge seals.
- [c5] 5. The system of claim 1, wherein the system further comprises a reference sensor circuit positioned on the IC chip, and the resistance of the moisture damage sensor circuit is compared to the resistance of the reference sensor circuit.
- [c6] 6. The system of claim 1, wherein the system further comprises a reference sensor circuit positioned on the IC chip, and the leakage of the moisture damage sensor circuit is compared to the leakage of the reference sensor circuit.
- [c7] 7. The system of claim 1, wherein the sensor circuit comprises a via chain including a plurality of vias connected in series to form the sensor circuit.
- [c8] 8. The system of claim 1, wherein the IC chip comprises a plurality of wiring levels, and the sensor circuit comprises a wire monitor circuit extending through a plurality of wiring levels, with a minimum of two vias per wiring level, and the plurality of wiring levels are con-

nected in series by the vias extending between the wiring levels, such that the conductive wire path of the sensor circuit forms a serpentine conductive path which zig zags back and forth over the wiring levels and the vias of the IC chip.

- [c9] 9. The system of claim 8, wherein the sensor circuit comprises a stacked wire sensor circuit having additional vias connected between the plurality of wiring levels to lower the overall resistance of the stacked wire sensor circuit.
- [c10] 10. The system of claim 1, including a plurality of sensor circuits positioned along peripheral edges of the IC chip to detect when the moisture barrier/edge seal on the IC chip is damaged.
- [c11] 11. The system of claim 10, wherein the plurality of sensor circuits comprise a plurality of via chains.
- [c12] 12. The system of claim 10, wherein the plurality of sensor circuits comprises a plurality of interconnects.
- [c13] 13. The system of claim 10, wherein the system monitors the resistance ratios of the plurality of sensor circuits.
- [c14] 14. The system of claim 10, wherein the system moni-

tors the leakage of two neighboring sensor circuits.

- [c15] 15. The system of claim 10, wherein the system monitors the leakage ratios of two neighboring sensor circuits.
- [c16] 16. The system of claim 10, wherein the plurality of sensor circuits are wired together in series to form a single detection circuit.
- [c17] 17. A method for detecting moisture penetration into a conductor on an integrated circuit (IC) chip comprising an insulator which includes a low-K dielectric material, comprising:
forming an edge seal for the IC chip; and
placing a moisture sensor on the IC chip in proximity to the edge seal.
- [c18] 18. The method of claim 17, further comprising positioning a reference sensor circuit on the IC chip, and comparing an electrical parameter of the moisture damage sensor circuit to the same electrical parameter of the reference sensor circuit.
- [c19] 19. The method of claim 17, further comprising positioning a plurality of sensor circuits along peripheral edges of the IC chip to detect when the moisture barrier/edge seal on the IC chip is damaged.

[c20] 20. The method of claim 19, further comprising wiring the plurality of sensor circuits together in series to form a single detection circuit.